

SERO-FUGE
Centrifuge
[Model Nos. 0521 and 0522]

AND

SERO-FUGE II
Centrifuge
[Model No. 0541]

OPERATORS MANUAL

Read this manual thoroughly before operating equipment.

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CONTENTS

I.	INTRODUCTION	1
II.	INTENDED USE	1
III.	OPERATING INSTRUCTIONS	2
A.	Installation	2
1.	Rotors	2
2.	Load Balancing	3
3.	Power Requirements	3
B.	Centrifuge Controls	4
1.	SERO-FUGE Centrifuge	4
2.	SERO-FUGE II Centrifuge	4
C.	Rotors and Accessories	6
1.	12-Place Rotor	6
2.	6-Place Rotor	6
3.	SERO-LINER Disposable Liners	6
D.	Performance and Specifications	6
E.	Use of SERO-FUGE Centrifuges	7
1.	Cell Washing	7
2.	Agglutination Tests	7
3.	Incubation	8
F.	Calibration Procedures	8
G.	Operating Precautions	8
1.	Basic Procedures	8
2.	Operator Training	9
H.	Hazards	9
I.	Maintenance and Service	9
1.	Lubrication	9
2.	Governor Brushes	10
3.	Parts Replacement	10
4.	Cleaning	11
5.	Transporting Centrifuge	11
6.	Spare Parts and Accessories	11
IV.	BIBLIOGRAPHY	11
APPENDICES		
A.	Repair Instructions— SERO-FUGE Centrifuges	12
B.	Repair Instructions— SERO-FUGE II Centrifuge	16
C.	Illustrated Parts Breakdown and Spare Parts ..	20

I. INTRODUCTION

This manual provides operating instructions for the following Clay Adams centrifuges:

DESCRIPTION	MODEL NO.	NOMINAL VOLTAGE/Hz
SERO-FUGE Centrifuge	0521	115 volts, 60 Hz
SERO-FUGE Centrifuge	0522	220 volts, 50 Hz
SERO-FUGE II Centrifuge	0541	115 volts, 60 Hz

II. INTENDED USE

SERO-FUGE and SERO-FUGE II Centrifuges are compact, highly versatile machines for use in blood banks and clinical laboratories. They are specifically designed to simplify many basic test procedures, such as blood typing, cell washing, cross-matching, genotyping, Coombs testing, and Anti-Rh titers. All models incorporate a lid safety switch and guard bowl seal for maximum operator protection.

The SERO-FUGE Centrifuge, Figure 1, is a *single speed machine*. Its high speed (3400 rpm at a relative centrifugal force of 1000g) is designed to minimize centrifugation time in the laboratory.



Figure 1. SERO-FUGE Centrifuge.



Figure 2. SERO-FUGE II Centrifuge.

The SERO-FUGE II Centrifuge, Figure 2, is a *two speed machine* which has a high speed setting of 3400 rpm at a relative centrifugal force of 1000g. A low speed, half-force setting (2400 rpm at a relative centrifugal force of 500g) has also been added for use in the more delicate centrifugations of weak agglutination reactions.

III. OPERATING INSTRUCTIONS

A. INSTALLATION

1. Rotors

With the exception of a rotor, SERO-FUGE and SERO-FUGE II Centrifuges are shipped completely assembled. Before operating the machine, the rotor must be installed and locked into position.

Two interchangeable rotors are available for use with SERO-FUGE and SERO-FUGE II Centrifuges: a 12-Place Rotor (Figure 3) and a 6-Place Rotor (Figure 4).

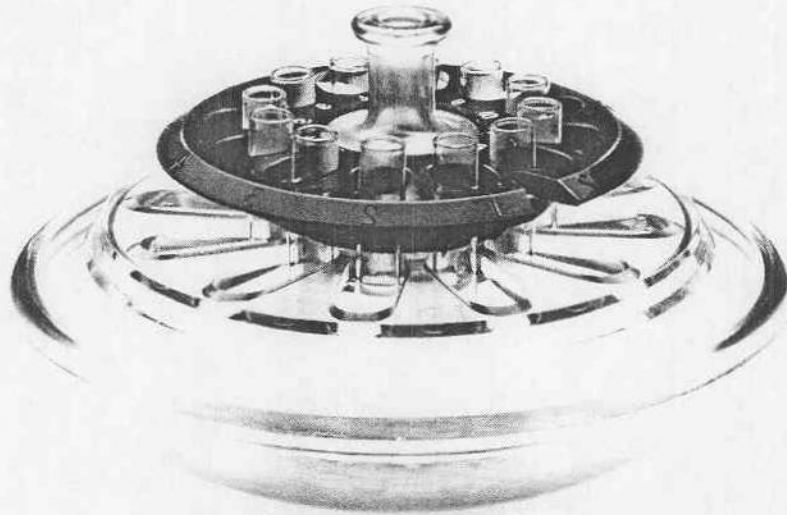


Figure 3. Twelve-Place Centrifuge Rotor Assembly.

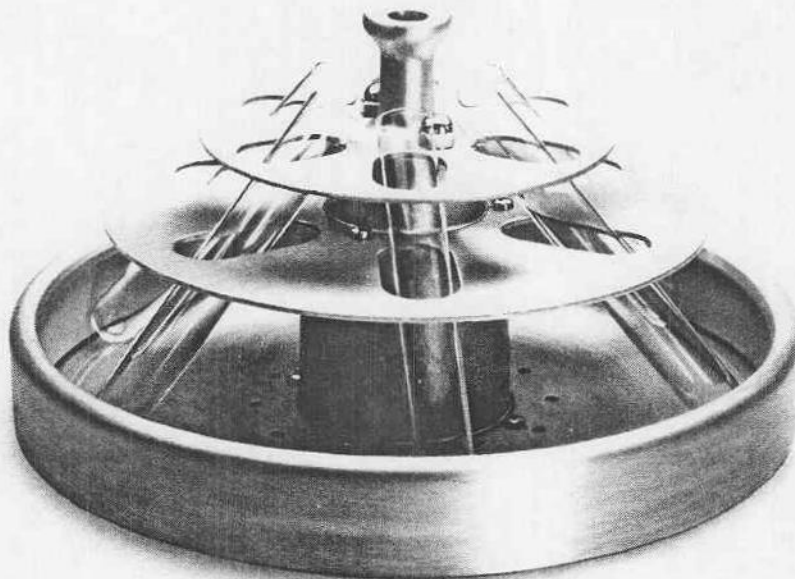
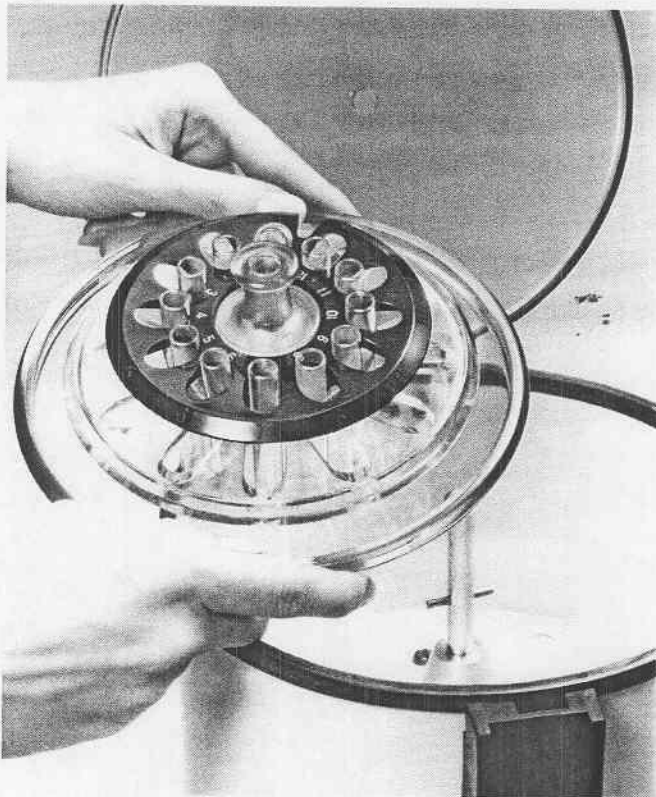


Figure 4. Six-Place Centrifuge Rotor Assembly.



Both rotors are installed in an identical manner by rotating on the drive spindle until the rotor drops over the drive pin (Figure 5) and locks into place.

Figure 5. Installing Rotor Over Centrifuge Drive Spindle.

2. Load Balancing

For smooth centrifuge operation and extended equipment life, it is essential that loads be balanced as equally as possible. Use of a balance is recommended for best results. NOTE: Never attempt to balance by adding weights, mercury or shot to the bottom of a tube.

3. Power Requirements

Connect the Model 0521 SERO-FUGE Centrifuge and Model 0541 SERO-FUGE II Centrifuge to a 3-wire grounded AC receptacle rated at 115 volts/60 Hz/15 amps. NOTE: The centrifuges may be operated between 105 volts and 130 volts, but operation at either of these extreme limits of voltage is not recommended because of reduced performance.

Connect the Model 0522 SERO-FUGE Centrifuge to a 3-wire grounded AC receptacle rated at 220 volts/50 Hz/7.5 amps. NOTE: The centrifuge may be operated between 210 volts and 260 volts, but operation at either of these extreme limits of voltage is not recommended because of reduced performance.

CAUTION

Connect the Centrifuge only to a 3-wire grounded receptacle. Where only a 2-wire receptacle is available, replace with a properly grounded 3-wire receptacle. Do not remove grounding prong from power plug of Centrifuge. If an extension cord is required, use only a 3-wire (grounded) extension cord rated for 115 volt or 220 volt service.

B. CENTRIFUGE CONTROLS

1. SERO-FUGE Centrifuges (Models 0521 and 0522)—Figure 6

● Electric Timer

The SERO-FUGE Centrifuge is provided with an electric timer to automatically stop centrifugation at intervals of up to five minutes. The timer is calibrated in 15-second increments for the first minute, and 30-second increments thereafter. To start the motor, rotate the setting knob clockwise from zero and set the pointer at the desired centrifugation time. This time interval can either be shortened or lengthened while the motor is running by simply turning the setting knob and pointer to the desired time. When the pointer is returned to zero, the motor will shut off.

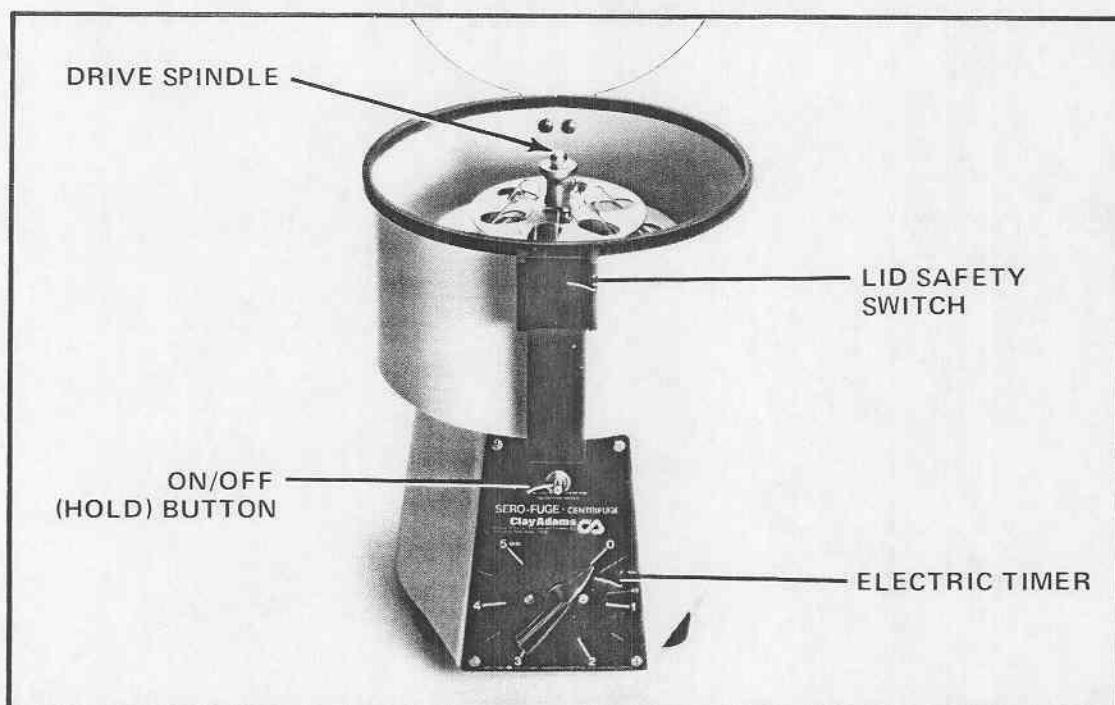


Figure 6. Controls on SERO-FUGE Centrifuge (Models 0521 and 0522).

● ON/OFF Switch

A pushbutton ON/OFF Switch is provided for continuous operation of the centrifuge. This switch will override the automatic timer at any point during a timed cycle.

● Safety Switch and Latch

When the cover of the centrifuge is open, a safety interlock switch is actuated preventing the motor from operating. The centrifuge will operate only with the cover closed and securely latched.

2. SERO-FUGE II Centrifuge (Model 0541)—Figure 7

● Electric Timer

The SERO-FUGE II Centrifuge is provided with an electric timer for automatically stopping centrifugation at intervals of 0 to 3 minutes. The

timer is calibrated in 5-second increments for the first minute, with 15-second increments thereafter. To start the motor, rotate the setting knob clockwise from OFF and set the pointer to the desired centrifugation time. This time interval can either be shortened or lengthened while the motor is running by simply turning the setting knob and pointer to the desired time. When the pointer is returned to OFF, the motor will shut off.

The timer on the SERO-FUGE II Centrifuge is also provided with a HOLD position for continuous operation. For continuous operation, rotate the setting knob clockwise to the HOLD position. Turn off by returning the knob counterclockwise to OFF.

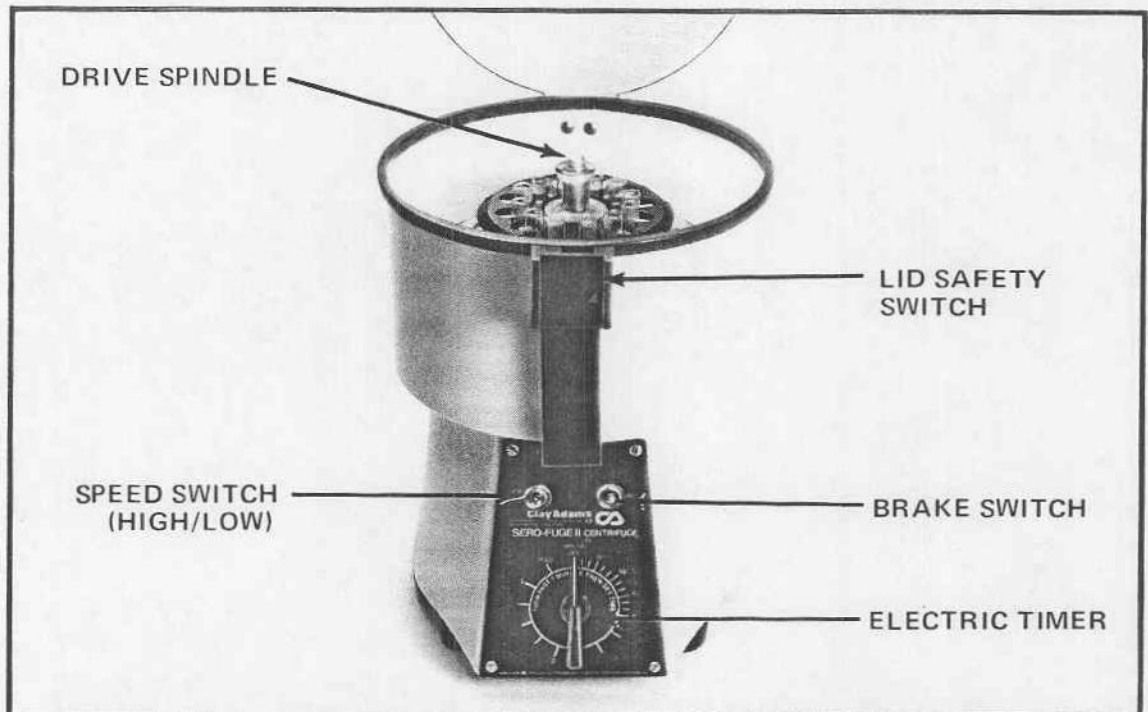


Figure 7. Controls on SERO-FUGE II Centrifuge (Model 0541).

- **Brake**

The SERO-FUGE II Centrifuge is equipped with an electric brake for shortening the deceleration time of the rotor. To brake the rotor, press the BRAKE switch down and hold it down until the rotor stops. Release the switch as soon as the rotor comes to rest. NOTE: Braking action is gentle and will not interfere with the centrifuged cell "button".

- **Speed Switch**

The two speeds of the SERO-FUGE II Centrifuge can be selected by flipping the speed switch up or down to obtain:

High Speed—1000g (3400 rpm)

Low Speed — 500g (2400 rpm)

- **Safety Switch and Latch**

When the cover of the centrifuge is open, a safety interlock switch is actuated, preventing the motor from operating. The centrifuge will operate only when the cover is closed and securely latched.

C. ROTORS AND ACCESSORIES

SERO-FUGE and SERO-FUGE II Centrifuges can be used with either the 12-place (Catalog No. 0545) rotor or 6-place (Catalog No. 0526) rotor. Both rotors are detachable and interchangeable between machines.

1. 12-Place Rotor, Catalog No. 0545

The 12-place rotor, Figure 3, can accommodate up to twelve 10 x 75mm Sero-Tubes, 12 x 75mm Kahn Tubes, or any other tubes not exceeding 12.7mm in diameter and 75mm in length. The rotor will also accommodate 5 ml VACUTAINER Brand Blood Collection Tubes. NOTE: Only six VACUTAINER Brand Blood Collection Tubes can be centrifuged if their rubber stoppers, which are wider in diameter than the tubes, are left in; the rotor will hold 12 VACUTAINER Brand Blood Collection Tubes without stoppers.

Any number of test tubes, except one or eleven, can be centrifuged without unbalancing the rotor, provided they are placed symmetrically about the spindle. Tubes swing out to an angle of 45° when the rotor is spinning, and return to a vertical position at rest. A retaining ring is provided in the rotor to hold the tubes firmly in place. The rotor can therefore be inverted to pour off supernatant liquid.

2. 6-Place Rotor, Catalog No. 0526

The 6-place rotor, Figure 4, can accommodate up to six 13 x 100mm or six 16mm x 100mm tubes, including the commonly used 7 ml and 10 ml sizes of 100mm VACUTAINER Brand Blood Collection Tubes. Tubes are centrifuged at a fixed angle of 45°. The 6-place rotor is used primarily to obtain serum.

3. SERO-LINER

Disposable Centrifuge Liner

The SERO-LINER Disposable Centrifuge Liner, Figure 8, is an optional accessory for use with either SERO-FUGE Centrifuges or the SERO-FUGE II Centrifuge. The Liner (Catalog No. 0548) is a molded white plastic insert that slips easily into the centrifuge guard bowl, thus extending centrifuge life and making clean-ups unnecessary. Liners are supplied with wash cycle indicator clips.

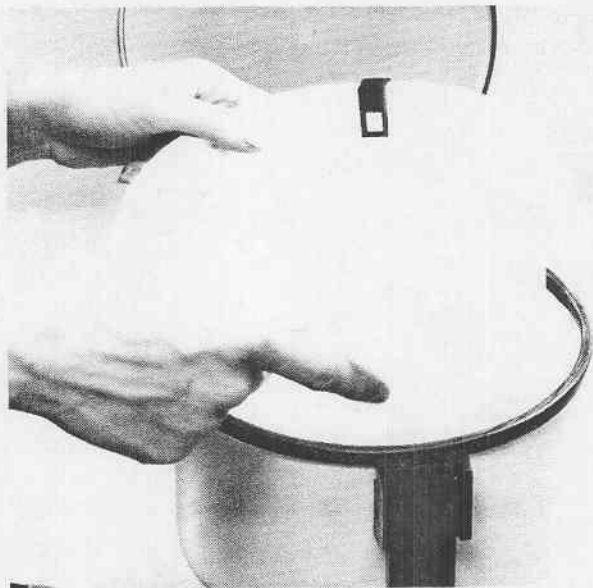


Figure 8. Installing SERO-LINER Disposable Liner.

D. PERFORMANCE AND SPECIFICATIONS

● Equipment Identification

SERO-FUGE Centrifuge Model No. 0521 or Model No. 0522
SERO-FUGE II Centrifuge, Model No. 0541

● **Speeds and Centrifugal Forces**

(Under Full Load, 6 or 12-place Rotor)

Model No.	Speed (RPM)	Relative Centrifugal Force—RCF (g)
0521	3300 Min.	1000
0522	2750 Min.	694
0541 (2-Speed)		
High Setting	3300 Min.	1000
Low Setting	2400 $\pm$ 100	500

● **Motor Ratings**

Model Nos. 0521 and 0541: 115 volts AC/60 Hz/1.6 amps

Model No. 0522 220 volts AC/50 Hz/ .8 amps

● **Centrifuge Weights and Dimensions**

(Closed Machine, All Models) Maximum Diameter: 8 $\frac{1}{4}$ "

Height: 10 $\frac{3}{4}$ " Net Weight: 19 lbs. (fully loaded)

E. USE OF SERO-FUGE AND SERO-FUGE II CENTRIFUGES

SERO-FUGE-type Centrifuges, rotors and accessories have been designed to facilitate the performance of blood testing procedures involving centrifugation, incubation and cell washing with a minimum of tube handling. Many procedures can be performed entirely without removing tubes from the centrifuge head, thus reducing the possibility of errors in transferring tubes. Tubes can be centrifuged and incubated without removal from the rotor.

The following notes on use of SERO-FUGE and SERO-FUGE II Centrifuges in the more common test procedures are intended to set practical guidelines for the technologist. Many standard texts and handbooks (see Bibliography, Section IV) provide recommendations regarding time periods for various centrifugations.

1. Cell Washing

The 12-place Centrifuge Rotor, Catalog No. 0545, may be conveniently used for many tests that require single or multiple blood cell washings, such as the Direct or Indirect Coombs test, the elution technic of antibody identification, etc. A one-minute spin in the SERO-FUGE Centrifuge (or one minute at the High Speed setting in the SERO-FUGE II Centrifuge) is generally sufficient to produce a button of cells of the required hardness for washing. Because the tubes are maintained at an angle of 45° during centrifugation, the centrifuge is highly efficient in washing cells. The cells are deposited quickly after sliding down the walls of the angled tubes.

After the button is formed, the supernatant saline solution can be readily poured off all tubes simultaneously by removing the rotor from the drive spindle immediately after it stops spinning, and inverting the rotor.

2. Agglutination Tests

Whenever possible, it is *important* that the serum manufacturer's instructions be followed on recommended time periods for centrifuging cells with the sera in the SERO-FUGE or SERO-FUGE II Centrifuges. Some serum manufacturers have recommended a centrifugation time of 30 seconds at high speed (3400 rpm).

Others recommend 15 seconds at high speed. Where instructions are not specifically given, the 30-second spin at high speed is generally accepted as the MAXIMUM for an agglutination test.

Some technologists have been trained to read, or prefer to read, albumin and saline agglutination test buttons that are not as tight or hard as those obtained after 30 seconds spinning. Under these circumstances, the technologist may use the low speed (2400 rpm) of the SERO-FUGE II Centrifuge to produce a button of desired hardness. An agglutination spin of 1 to 2 minutes at low speed is generally optimum.

If using the single speed SERO-FUGE Centrifuge, the technologist will have to reduce the spinning time to produce a button of desired hardness.

It is recommended that the optimum centrifugation period be determined by controlled reactions using known cells. This method is the easiest way to determine the time necessary to produce the desired tightness of agglutination. It should be noted that longer centrifugations will always be required for diluents, such as bovine albumin, which are more viscous than saline.

3. Incubation

Many blood testing procedures (such as Rh typing and Rh antibody titrations, tests for immune Anti-A and Anti-B, clarifying indeterminate reactions in the Coombs test or in cross-matching, etc.) require incubation before or after centrifugation. Centrifuge rotors have been designed to allow the incubation of these reactions without removing the tubes from the rotor. The entire rotor may be lowered into a water bath for the test being performed. When the rotor is removed, water will drain through the perforations in its base. The rotor will then be ready for re-centrifugation, or for transporting the tubes.

F. CALIBRATION PROCEDURES

The speed or speeds of SERO-FUGE and SERO-FUGE II Centrifuges may be checked with any accurate tachometer, such as an ADAMS Photo Electric Tachometer, Model 5205. NOTE: Mechanical tachometers that contact the rotor are to be avoided. Speed must be measured with a rotor installed and the cover closed and latched.

If the machine speed(s) is found to be outside specified limits (see Subsection II-D, Performance and Specifications, above), then the supply voltage should be checked with an accurate monitor. Deviations in line voltage and frequency will affect operating speed. If speeds are outside specified limits, contact your nearest Clay Adams equipment dealer for service, or call Clay Adams Technical Service Department: (201) 887-4800.

G. OPERATING PRECAUTIONS

1. Basic Procedures

In order to obtain properly centrifuged specimens and to prevent damage to the machine, the following basic operating precautions should be carefully observed when using the SERO-FUGE or SERO-FUGE II Centrifuge.

- **Electrical:** Operate the centrifuge only from an AC power source approved for the particular model.

- **Load Balancing:** For smooth operation and long service life, it is important that tubes are installed in a balanced array.
- **Timing:** For accurate results, follow the timing routines recommended in this Manual or by serum manufacturers.
- **Cleanliness:** Keep the centrifuge clean and dust-free in accordance with Maintenance and Service Instructions supplied in this Manual. Avoid spilling liquids into the centrifuge bowl.

2. Operator Training

SERO-FUGE and SERO-FUGE II Centrifuges are electrical instruments designed to produce specimens for medical purposes. Use of these instruments for medical evaluation places a responsibility upon administrative personnel for adequate training of operators in their safe and effective use.

Administrative personnel should make certain that all operators and technologists receive adequate training before operating the centrifuge. Such training should include a thorough working knowledge of:

- Centrifuge set-up and power requirements,
- Handling and preparation of samples, and
- Equipment service and maintenance.

H. HAZARDS

Basic safety precautions must be observed when operating the centrifuge in order to avoid the hazards of electrical shock or other physical injury.

SERO-FUGE and SERO-FUGE II Centrifuges are not to be used in a Class 1, Division 1, Group C hazardous location defined by the National Fire Protection Association, Bulletin No. 56A (Inhalation Anesthetics), as extending upward to a level of 5 feet above the floor where flammable anesthetics are used.

To Avoid Electrical Shock:

- Plug the power cord only into a grounded 3-wire receptacle.
- Never remove the grounding prong from the power plug.
- Always unplug the power cord before attempting to service centrifuge.

To Avoid Physical Injury:

- Never, under any condition, attempt to open the cover of the centrifuge while the rotor is spinning.

I. MAINTENANCE AND SERVICE

SERO-FUGE and SERO-FUGE II Centrifuges are guaranteed against defective workmanship and materials for a period of one year from date of delivery. Required maintenance and authorized service and repairs which can be performed by laboratory personnel are described below. Refer all other service problems to your nearest Clay Adams equipment dealer, or call Clay Adams Technical Service Department: (201) 887-4800.

1. Lubrication (All Models):

Motors in the SERO-FUGE and SERO-FUGE II Centrifuges incorporate permanently lubricated bearings. No lubrication is required for the life of the centrifuge.

2. Governor Brushes (SERO-FUGE II Centrifuge Only):

At six month intervals, the governor brushes in the **SERO-FUGE II Centrifuge** should be inspected for wear and replaced if worn to $\frac{1}{8}$ -inch in length.

CAUTION:

Always disconnect power cord from receptacle before attempting to inspect or replace governor brushes.

To inspect the governor brushes:

- (a) Turn the SERO-FUGE II Centrifuge over and remove the bottom plate by unscrewing the four rubber feet.
- (b) Referring to Figure 9, locate the Governor Brush Block. The brushes may be inspected without disassembly as shown below.

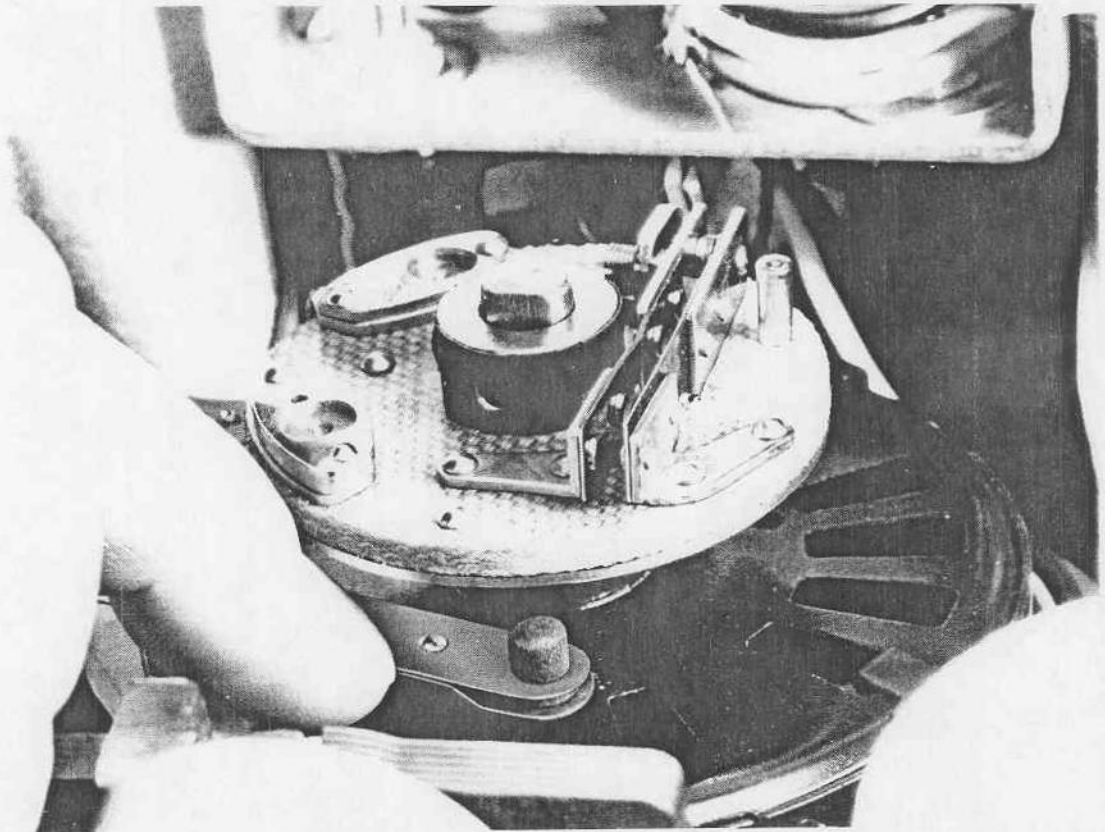


Figure 9. Inspect Brushes of SERO-FUGE II Centrifuge for Wear by Depressing Springs to Expose Brush Surface.

- (c) If brushes are worn to $\frac{1}{8}$ -inch in length, replace brush assembly in accordance with instructions in Appendix B.

3. Parts Replacement (All Models):

Occasionally, it may be necessary to disassemble the centrifuge in order to replace a defective part. Complete repair and replacement procedures for the SERO-FUGE and SERO-FUGE II Centrifuges are contained in Appendices A and B, respectively.

4. Cleaning

It is recommended that interior and exterior surfaces of the centrifuge bowl, rubber channel, guard seal, rotor and cover be wiped occasionally with a damp cloth. A mild detergent may be used to remove stains. Keeping these parts clean will prolong the life of the centrifuge.

The transparent cover of the centrifuge is made of a shatterproof polycarbonate resin, resistant to a wide range of laboratory chemicals. It is recommended, however, that the cover be kept clean and that spillage be wiped off as soon as possible. A mild detergent should be used. Do not use carbon tetrachloride, gasoline or acetone. Other chemicals, such as aromatic hydrocarbons, (benzene, toluene, xylene) and strong alkalies, (sodium and ammonium hydroxide) can damage the cover.

5. Transporting Centrifuge

Though SERO-FUGE and SERO-FUGE II Centrifuges can withstand the rigors of normal laboratory use, they can be damaged by dropping or by excessive abuse in handling. If the centrifuge must be shipped, package it carefully in a strong, shock-proof container to prevent damage from vibration and impact.

6. Spare Parts and Accessories

Spare parts and accessories for your centrifuge can be obtained through your nearest Clay Adams equipment dealer. Part numbers are listed in Appendix C.

IV. BIBLIOGRAPHY

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APPENDIX A
REPAIR INSTRUCTIONS
SERO-FUGE Centrifuge—Models 0521 and 0522

CAUTION:

Unplug power cord from receptacle and remove rotor before disassembling centrifuge. All service should be performed by trained and authorized personnel.

A. REPLACING "HOLD" SWITCH OR TIMER ASSEMBLY

1. Referring to Figure 10, turn the centrifuge over and remove the four rubber feet and base plate.

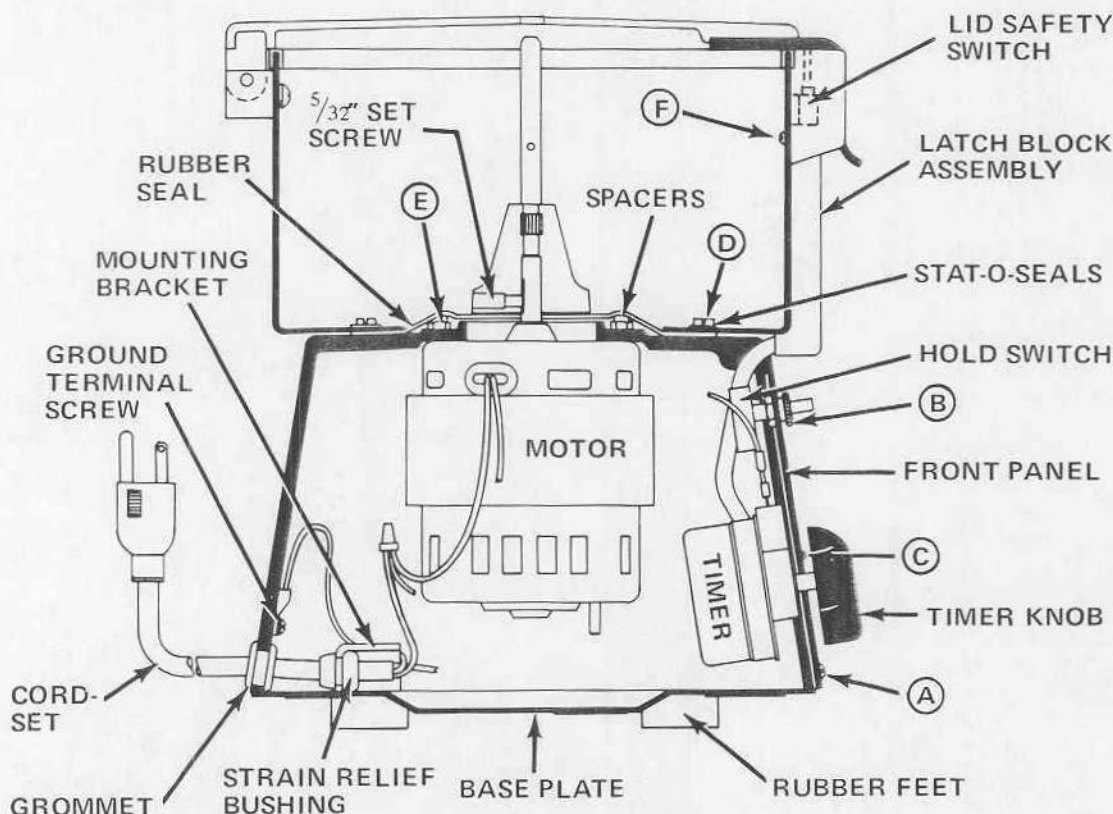


Figure 10. Cutaway View of SERO-FUGE Centrifuge.

2. Remove the four screws "A" from the front control panel and pull panel out.
3. To Replace the "HOLD" Switch:
 - (a) Remove the knurled nut "B" which secures the Hold Switch to the front panel.
 - (b) Remove the old switch, insert replacement switch and secure to front panel with nut "B".
 - (c) Referring to the Wiring Diagram in Figure 11, cut wire splice (L) that terminates the red Hold Switch wire; strip $\frac{3}{8}$ -inch insulation from Safety

- Switch wire (1) and Timer Switch wire (2).
- (d) Crimp these two wires to the new red Hold Switch wire, using a wire splice or by covering with electrical tape.
 - (e) Cut off the crimp wire splice (M) that terminates the blue Hold Switch lead; strip $\frac{3}{8}$ -inch insulation from white Timer Motor wire (3) and the Timer Switch wire (4).
 - (f) Crimp these two wires to the new blue Hold Switch wire, using a wire splice or by covering with electrical tape.
 - (g) Remove and replace the crimp (N) connecting the black Hold Switch wire to the black Motor wire (5), using a wire splice or by covering with electrical tape.
 - (h) Reassemble front panel and base plate.
4. To Replace the Timer:
- (a) Referring to Figure 10, remove the Timer Knob by unscrewing the recessed set screw and two Timer mounting screws "C".
 - (b) Replace old Timer with new unit.
 - (c) Referring to Figure 11, remove the two Timer Switch wires from their terminals on the old timer and transfer to terminals of new Timer.
 - (d) Cut off the crimp wire nut (M) that terminates the black Timer Motor wire; strip $\frac{3}{8}$ -inch insulation from the black Timer Switch wire (4) and the blue Hold Switch wire. Crimp these two wires to the new white Timer Motor wire, using a wire splice or by covering with electrical tape.

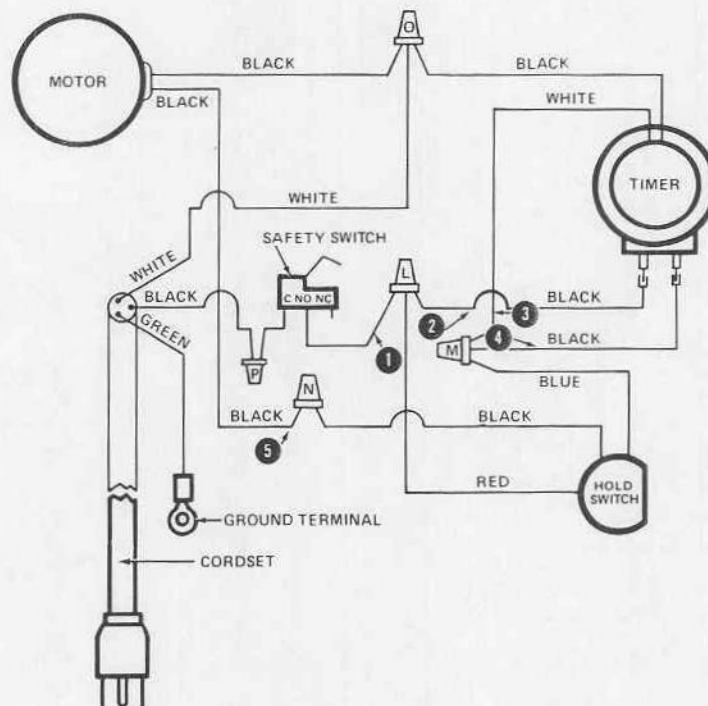


Figure 11. SERO-FUGE Centrifuge Wiring Diagram.

- (e) Cut off the crimp wire nut (O) that terminates the black Timer Motor wire; strip $\frac{3}{8}$ -inch insulation from the white Cordset wire and black Motor wire. Crimp these two wires to the new black Timer Motor wire, using a wire splice or by covering with electrical tape.
- (f) Reassemble front panel and base plate.

B. REPLACING MOTOR

1. Open cover of centrifuge and remove rotor.
2. Referring to Figure 10, remove the six screws (D) and Stat-O-Seals holding the guard assembly, and lift guard assembly aside. NOTE: The Safety Switch wires should remain connected.
3. Remove the Drive Spindle by loosening the set screw. Lift off rubber seal and rubber spacers over the four nuts (E); remove nuts.
4. Close cover, turn the centrifuge over and remove the four rubber feet and base plate; lift old motor from base.
5. Referring to Figure 11, cut off crimp wire splice (N) joining the black Motor wire to the black Hold Switch wire. Strip $\frac{3}{8}$ -inch insulation from the Hold Switch wire and crimp to the new Motor wire, using a wire splice or by covering with electrical tape.
6. Cut off the crimp wire splice (O) joining the white Cordset wire, Motor wire and Timer Motor wire. Strip $\frac{3}{8}$ -inch insulation from wires and crimp to new Motor wire, using a wire splice or by covering with electrical tape.
7. Turn centrifuge over and replace the four nuts (E) holding the motor. Replace the spacers, rubber seal, guard bowl, Stat-O-Seals, guard bowl screws, and spindle. NOTE: Align the spindle set screw with the shaft-flat before tightening. Reassemble guard.

C. REPLACING CORDSET

1. Turn the machine over and remove the four rubber feet and base plate.
2. Referring to Figure 11, cut the crimp wire connectors (O) and (P) terminating the black and white Cordset wires and remove the terminal screw holding the green grounding wire. Pull the cord out of the centrifuge.
3. Slip a new Rubber Grommet on the new line cord. Referring to Figure 10, press the Strain Relief Bushing in the slot of the Mounting Bracket.
4. **NOTE: SCREW THE GREEN GROUNDING WIRE TO THE CASTING.**
5. Strip $\frac{3}{8}$ -inch insulation from the black Timer Motor wire and the black Motor wire. Crimp these to the white Cordset wire, using a wire splice or by covering with electrical tape.
6. Strip $\frac{3}{8}$ -inch insulation from the Safety Switch wire. Crimp wire to the black Cordset wire, using a wire splice or by covering with electrical tape.
7. Reassemble the base plate and rubber feet. NOTE: MAKE CERTAIN THE GREEN GROUNDING WIRE IS SECURELY FASTENED TO THE CASTING.

D. REPLACING LID SAFETY SWITCH

1. Referring to Figure 10, remove the four screws (F) which secure the Latch Block Assembly to the guard bowl.
2. Turn Centrifuge over and remove base plate in accordance with Step A-1, above.
3. Referring to Figure 11, cut old Safety Switch leads at wire splices (L) and (P). Remove old Safety Switch.
4. Thread leads of new Switch through Latch Block and hole in Centrifuge base.
5. Crimp one lead of new Safety Switch to the black Cordset wire; crimp other lead to red Hold Switch wire and black Timer wire (2), using a wire splice or by covering with electrical tape.
6. Reassemble base plate and rubber feet.
7. Turn Centrifuge over. Install Safety Switch in Latch Block and replace four Latch Block retaining screws.

APPENDIX B
REPAIR INSTRUCTIONS
SERO-FUGE II Centrifuge—Model 0541

CAUTION:

Unplug power cord from receptacle and remove rotor before disassembling centrifuge. All service should be performed only by trained and authorized personnel.

A. REPLACING COMPLETE NAMEPLATE ASSEMBLY

1. Referring to Figure 12, turn the centrifuge over, remove the four rubber feet and baseplate; remove the four screws "A" holding the front Nameplate Assembly to the base and pull Assembly out.

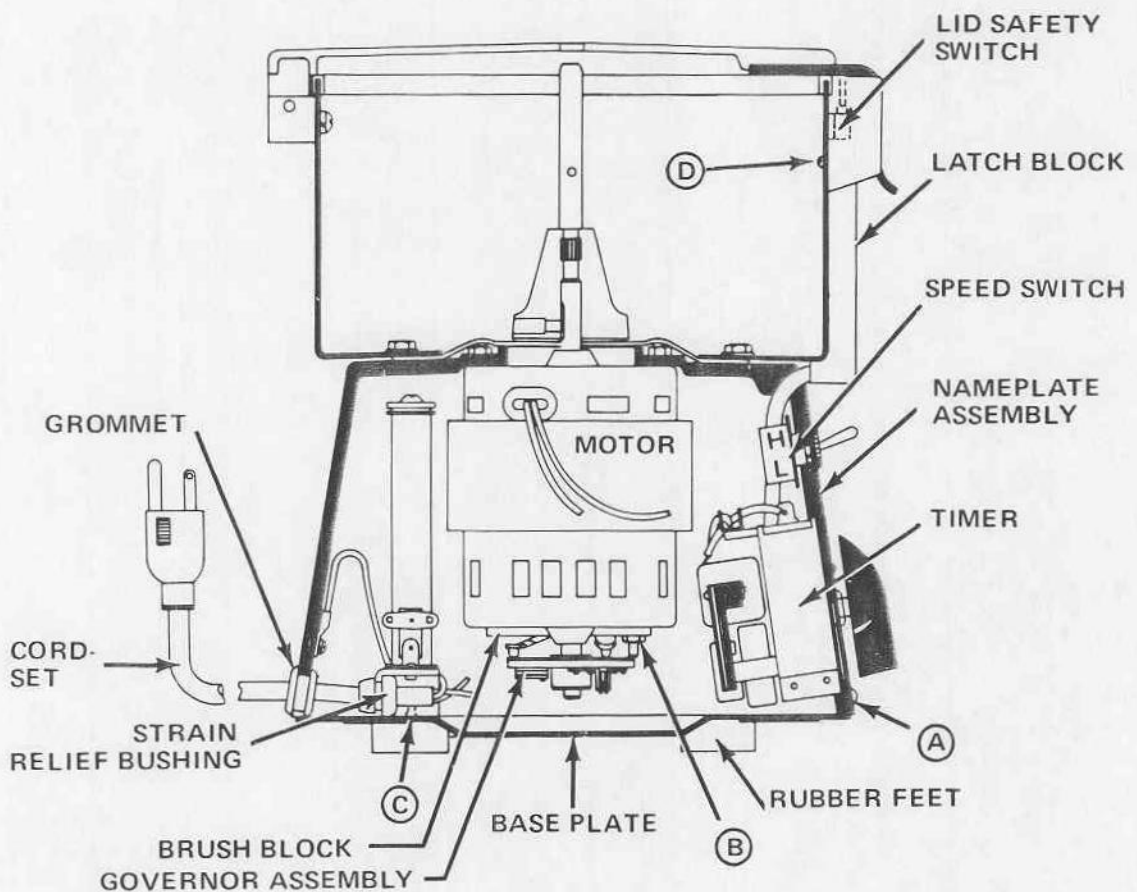


Figure 12. Cutaway View of SERO-FUGE II Centrifuge.

2. Remove the eight connectors from the old Nameplate Assembly and transfer to the new Assembly according to the Wiring Diagram in Figure 13.
3. Reassemble machine.

B. REPLACING TIMER, SPEED SWITCH OR BRAKE SWITCH

1. Proceed according to Step A-1, above.
2. Remove Timer Switch, Speed Switch or Brake Switch by removing the appropriate mounting nut from front of Nameplate Assembly. Replace with the new component and re-wire according to the Wiring Diagram in Figure 13.

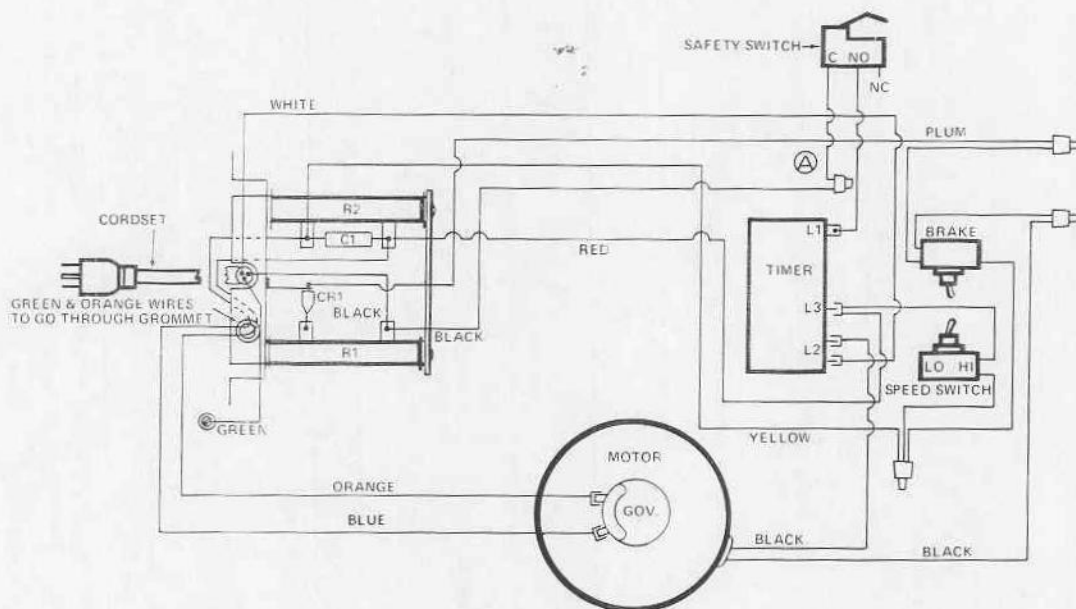


Figure 13. SERO-FUGE II Centrifuge Wiring Diagram.

C. REPLACING GOVERNOR BRUSHES (see Figure 14)

If the governor brushes are worn to within 1/8-inch in length, replace brush block as follows:

1. Referring to Figure 12, remove the two nuts "B" from the Motor housing; remove brush block and disconnect wires from brush block terminals.
2. Install new brush block assembly and mounting nuts, and reconnect wires to new brush block terminals.
3. Check and adjust governor for $\frac{11}{32}$ " clearance between brush block plate surface and governor slip rings (see Figure 14).
4. To adjust clearance, loosen set screw which secures governor assembly to motor shaft as shown in Figure 14; adjust governor for $\frac{11}{32}$ " clearance and retighten set screw.

D. REPLACING GOVERNOR OR MOTOR

1. Turn the centrifuge over; remove the rubber feet and baseplate.
2. Referring to Figure 14, remove the Governor by loosening the set screw; remove the Governor Brush Block as described in C-1, above. To replace the motor, proceed to step 3.
3. Remove one Motor Lead from the center terminal of the Brake Switch and the other from the Timer terminal (see Figure 13).

4. Follow Steps B-2 and B-3 of Appendix A to remove Motor.
5. Install new Motor assembly. Crimp the push-on terminals on the new motor wires, using a wire splice or by covering with electrical tape.

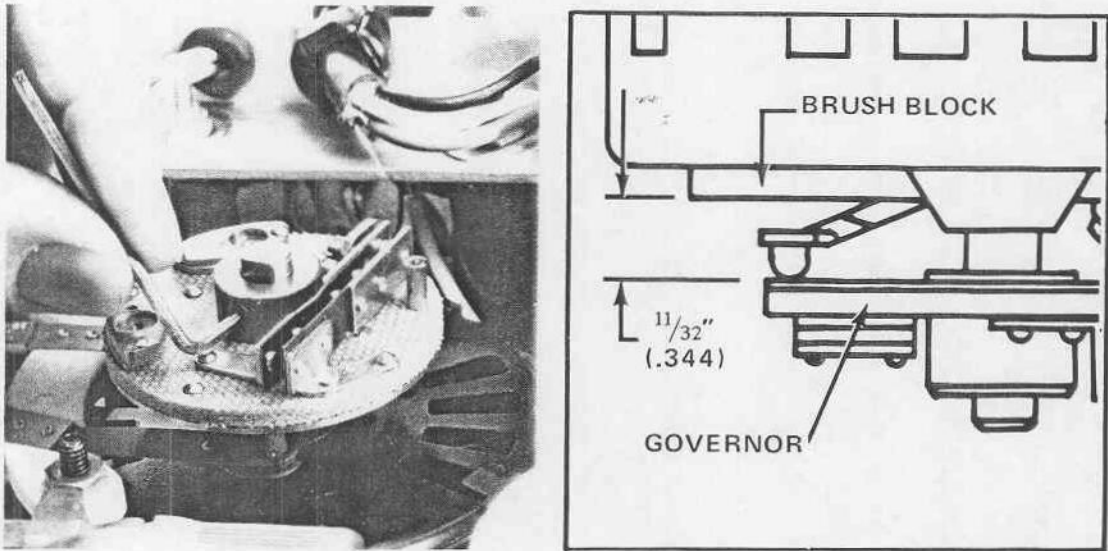


Figure 14. Loosening Governor Assembly (left) for Clearance Adjustment.

6. Connect the Motor wires to the Nameplate Assembly (see Figure 13).
7. Replace motor mounting nuts, spacers, rubber seal, guard bowl, Stat-O-Seals, guard bowl screws, spindle, brush block and governor unit.

NOTE: The Governor unit must be adjusted as described above for $\frac{11}{32}$ " clearance between the Governor slip rings and the brush block surface.

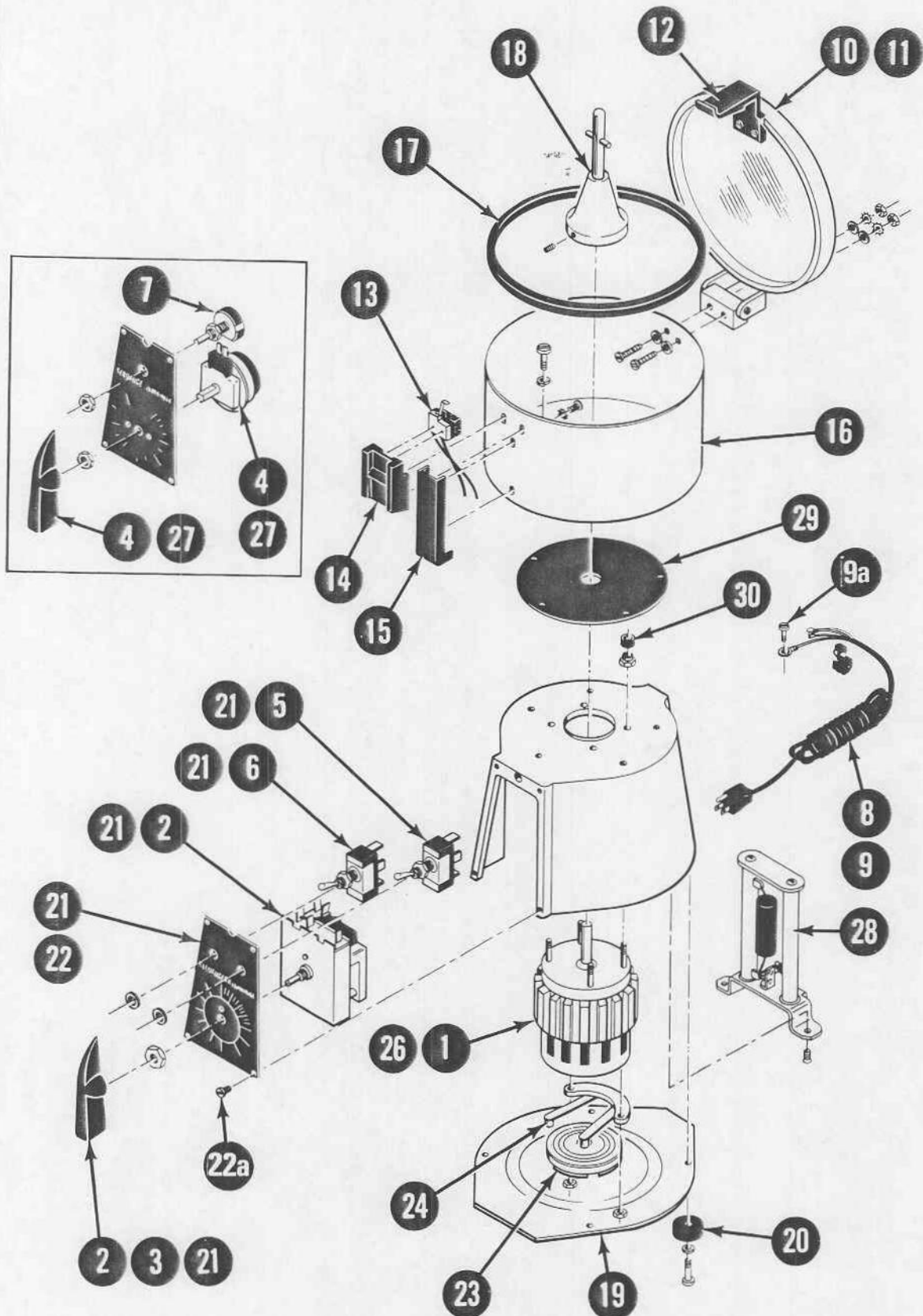
E. REPLACING CORDSET

1. Turn the centrifuge over and remove the four rubber feet and base plate.
2. Referring to Figure 12, remove the two screws (C) securing the Resistor Mounting Assembly and Bracket to the base; pull the bracket and assembly out of the machine.
3. Remove the white Cordset wire from Timer terminal L-2 and unsolder the black Cordset wire from resistor R-1 (see Figure 13).
4. Remove the green Cordset wire by removing the terminal mounting screw.
5. Remove the old Cordset and replace. **NOTE: THE GREEN GROUND WIRE MUST BE RE-ATTACHED TO THE CASTING BY MEANS OF THE SCREW AND LOCKWASHER PROVIDED.**
6. Solder the black Cordset wire to resistor R-1; attach the connector on the white wire to Timer terminal L-2.
7. Reassemble strain relief bushing, grommet and base hardware.

F. REPLACING LID SAFETY SWITCH

1. Referring to Figure 12, remove the four screws (D) which secure the Latch Block to the guard bowl.
2. Turn Centrifuge over and remove base plate in accordance with Step A-1, above.
3. Referring to Figure 13, cut old Safety Switch lead at wire splice (A). Disconnect other lead of old Switch from Terminal L1 of Timer. Remove old Safety Switch.
4. Thread leads of new Switch through Latch Block and hole in Centrifuge base.
5. Crimp one Safety Switch lead to the black wire from Resistor R1, using a wire splice or by covering with electrical tape. Connect other lead to Terminal L1 of Timer.
6. Reassemble base plate and rubber feet.
7. Turn Centrifuge over. Install Safety Switch in Latch Block and replace four Latch Block retaining screws.

APPENDIX C ILLUSTRATED PARTS BREAKDOWN AND SPARE PARTS



1. MOTOR (115 Volt) Nut, Hex No. 8-32 (4)	0541-600-000	15. FRONT COVER Screw, Self-Tapping (2) Lockwasher, No. 6 Int. (2)	0541-617-100
2. TIMER & KNOB (0541) Wiring Instructions	0541-601-000	16. GUARD	0541-605-101
3. KNOB ONLY (0541)	0541-601-101	17. CHANNEL, RUBBER	0521-608-001
4. TIMER & KNOB (0521) Screw, Rd. Hd. No. 5-40 x 5/16 Lg. (2) Wiring Instructions	0521-601-000	18. SPINDLE ASSEMBLY Spindle Roll Pin, 1/8 Dia x 1" Lg. Spindle Rod Set Screw, No. 10-32 x 3/8 Lg.	0521-606-000
5. SWITCH ASSEMBLY, BRAKE (0541) Wiring Instructions	0541-602-000	19. BOTTOM PLATE	0541-607-000
6. SWITCH ASSEMBLY, HI-LO (0541) Wiring Instructions	0541-611-000	20. RUBBER FOOT & HARDWARE (4 per Package) Screw, Pan Hd. No. 8-32 x 5/8 Lg. (4) Washer, No. 8 Flat (4)	0541-608-000
7. SWITCH, HOLD (0521) Wiring Instructions	0521-602-000	21. NAMEPLATE ASSEMBLY (0541) Nameplate Timer Knob Switch, Hi-Lo Switch, Brake Wiring Instructions	0541-610-100
8. CORDSET ASSEMBLY (0541) Cordset Ring Terminal Push-On Terminal Strain-Relief Bushing Wiring Instructions	0541-603-000	22. NAMEPLATE ONLY (0541)	0541-610-101
9. CORDSET ASSEMBLY (0521) Cordset Ring Terminal Strain-Relief Bushing Wiring Instructions	0521-603-000	*22a. Screw, Binding Hd. No. 5-40 x 1/4 Lg.	
*9a. Screw, Binding Hd. No. 5-40 x 1/4 Lg. Lockwasher, No. 5 Split		23. GOVERNOR UNIT TYPE C5 (0541) Assembly Instructions	0541-612-000
10. COVER ASSEMBLY Cover Hinge Block Latch Screw, Pan Hd. No. 6-32 x 1/4 Lg. (2) Lockwasher, No. 6 Int. (2) Washer, No. 6 Flat (2) Screw, Pan Hd. No. 8-32 x 15/16 Lg. (2) Lockwasher, No. 8 Ext. (2) Washer, No. 8 Flat (4) Nut, Hex No. 8-32 (2) Assembly Instructions	0541-604-100	24. BRUSH ASSEMBLY-GOVERNOR (0541) Nut, Hex No. 8-32 (2)	
11. COVER ONLY	0541-604-001	25. RUBBER STRIP LINER, For 6-Place Head (Not Illustrated)	0526-609-000
12. LATCH & LATCH HARDWARE Latch Screw, Pan Hd. No. 6-32 x 1/4 Lg. (2) Lockwasher, No. 6 Int. (2) Washer, No. 6 Flat (2)	0591-604-101	26. MOTOR ASSEMBLY (220 Volt) Nut, Hex No. 8-32 (4)	0552-600-000
13. SAFETY SWITCH With Cushion and Wiring Instructions	0541-602-101	27. TIMER & KNOB (220 Volt) Screw, Rd. Hd. No. 5-40 x 5/16 Lg. (2) Wiring Instructions	0552-601-000
14. LATCH BLOCK Screw, Self-Tapping (2) Lockwasher, No. 6 Int. (2)	0541-616-100	28. RESISTOR MOUNTING ASSEMBLY (SERO-FUGE II Centrifuge Only) Ready for Installation, with Wiring Instructions	0541-618-000
		29. RUBBER SEAL Rubber Seal Stat-O-Seals (6)	0541-614-100
		30. SPACER (4)	0541-615-100

*Attaching hardware not supplied (purchase locally)